

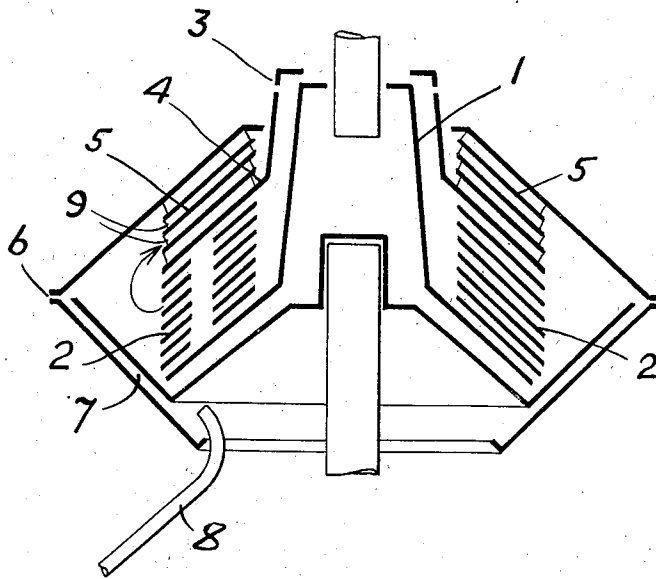
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CENTRIFUGE FOR SEPARATING SUBSTANCES OF DIFFERENT SPECIFIC GRAVITIES

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WITNESS:

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## UNITED STATES PATENT OFFICE

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## CENTRIFUGE FOR SEPARATING SUBSTANCES OF DIFFERENT SPECIFIC GRAVITIES

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## 1 Claim. (Cl. 233—27)

Centrifugal bowls designed for the clarification of liquids are generally provided with a fitting consisting of superposed conical discs. When the liquid is passing through the spaces between these discs, matters are separated therefrom which have a different specific gravity than the liquid. In the case of solid matters or sludges the specific gravity is generally higher than that of the liquid, and they will therefore accumulate on the lower sides of the discs and slide along their surfaces to a sludge chamber arranged outside the separating chamber.

When separating a liquid into two components, the heavier component of the liquid is generally discharged through channels arranged between the bowl top and a boundary wall, usually called a top disc, which separates the discharge channels from the separating chamber. In bowls of this type the top disc is usually provided with wings on its upper surface. If the liquid mixture contains solids, part of the solids, when the heavier component of the liquid is passing through the sludge chamber, is caught and carried to the above discharge channels. In some cases it is desirable that the velocity of the liquid in these channels should be sufficiently high to enable the discharge from the bowl of as large a percentage as possible of the sludge which has been caught by the liquid in the sludge chamber. This is generally the case in so-called industrial separators intended for the purification of various kinds of oils. There are, however, also separating problems in connection with which it is desirable that the heavier component of the liquid should be liberated from solid impurities as completely as possible.

The present invention comprises a centrifugal separator which is particularly suitable for the removal of solid matters from the discharging heavier component of the liquid. The invention is characterized in that the chamber above the top disc, through which the heavier component of the liquid is conducted from the sludge chamber to the outlet, is developed to a separating chamber. The figure is a vertical sectional view of one embodiment of the invention.

The mixture to be separated is fed to a central distributor 1 and flows through channels therein to a main or primary separating chamber containing a pile of superposed conical discs 2 spaced a suitable distance apart. The spacing apart of the discs, which determines the thickness of the separating layers thus formed, varies according to the mixture to be separated, and is generally on the order of from 0.5 to 3.0 mm. In the figure

the inlet holes are shown located comparatively close to the outer edge of the conical discs,—an arrangement which is used when it is desired to liberate the lighter liquid component as completely as possible from solid matters and from the heavier liquid component. The purified lighter liquid component is discharged through openings 3 in the top disc 4, which, as above stated, separates the discharge for the heavier liquid component from the separating chamber. The heavier liquid component separated in the separating chamber 2 flows outwards and thence upward into the space between the top disc and the bowl top. This space, in the embodiment of my invention illustrated, is wide enough to accommodate a number of superposed discs 5, which advantageously may have the same shape as the discs 2 in the main separating chamber. This space functions as a secondary or auxiliary separating chamber. As the liquid moves from its outer part inward between the discs 5, it is desirable to facilitate as completely as possible the liquid flow and therefore to provide the discs with wings 9, extending from the outer edge of the discs towards their centre. Openings 6 are provided in the bowl wall through which the separated solids can be discharged together with part of the heavier liquid component. Bowls of this type are used to advantage, for instance, in connection with separation of animal oils, such as herring and whale oil, which have been extracted by boiling and in which the oil becomes strongly mixed with residues of the cellular tissue and with so-called glue water. Such residues, discharging with the glue water, have not in the past been deemed of much value. More recently, however, conditions have changed and it is now deemed desirable to extract as large an amount as possible of the solid matters. It is therefore desirable to prevent the escape of any considerable proportion of solids through the outlet for the heavier liquid. This is accomplished according to the invention by means of the discs 5 arranged in the discharge channel.

In order that the products discharging through the openings 6 shall have as high a content of solids as possible it may be advantageous to introduce a liquid containing previously separated solids into the sludge chamber in the neighborhood of the openings 6. In the drawing such channels 7 are provided for the introduction of such a concentrate into the lower part of the bowl. The concentrate may be supplied through a tube 8, but it is of course also possible to supply the concentrate in other ways. In such a

construction, also, the provision of an auxiliary or secondary separating chamber, such as that containing the discs 5, is advantageous.

5 An upper separating chamber provided in the same bowl as a lower separating chamber has a higher separating efficiency than if it were located in a separate bowl into which heavier liquid treated in the separating chamber 2 were fed. This will be clear from the following explanation. In the separating chamber 2 the separated solid matters are enriched at the lower side of the discs and slide thereon as more or less solidly joined, united or adherent agglomerates. Generally the union is sufficiently strong not to be broken when they are brought from the sludge chamber to the discs 5 by the heavier component of the liquid. When such liquid is fed in between the discs 5 an easily separable agglomerate is thus obtained, which is not the case if the liquid were fed into an ordinary separator bowl, because the agglomerate is then to a great extent split up at the inlet. It is thus possible to secure a higher capacity and greater efficiency in the upper separating chamber of a bowl embodying my invention than in an individual bowl provided with the same number of discs of the same size.

What I claim and desire to protect by Letters Patent is:

30 A centrifugal separator for treating a mixture

of constituents of three different specific gravities to effect a comparatively clean primary separation of lighter constituent and a less thorough separation of the heaviest constituent from the constituent of intermediate specific gravity, which comprises a rotatable bowl enclosing the separating chamber and having upper and lower walls converging toward a peripheral outlet, a top disc provided with a neck up inside of which the separated lighter liquid outflows, a lower set of discs below the top disc, means to feed the mixture to be separated to the lower part of the separating chamber, and an upper set of discs in the space between the top disc and the upper bowl wall, said space having at its inner end an outlet for the constituent of intermediate specific gravity, all said discs extending substantially parallel to the upper bowl wall and the spaces between them opening freely into an open outer separating space of substantial radial width between the outer edges of the discs and the peripheral outlet, thereby providing a separating zone for the primary separation of the lighter constituent including the spaces between the lower discs and said open space and a zone for secondary separation of the two heavier ingredients including the spaces between the upper discs and said open spaces.

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